# FARM INDEX

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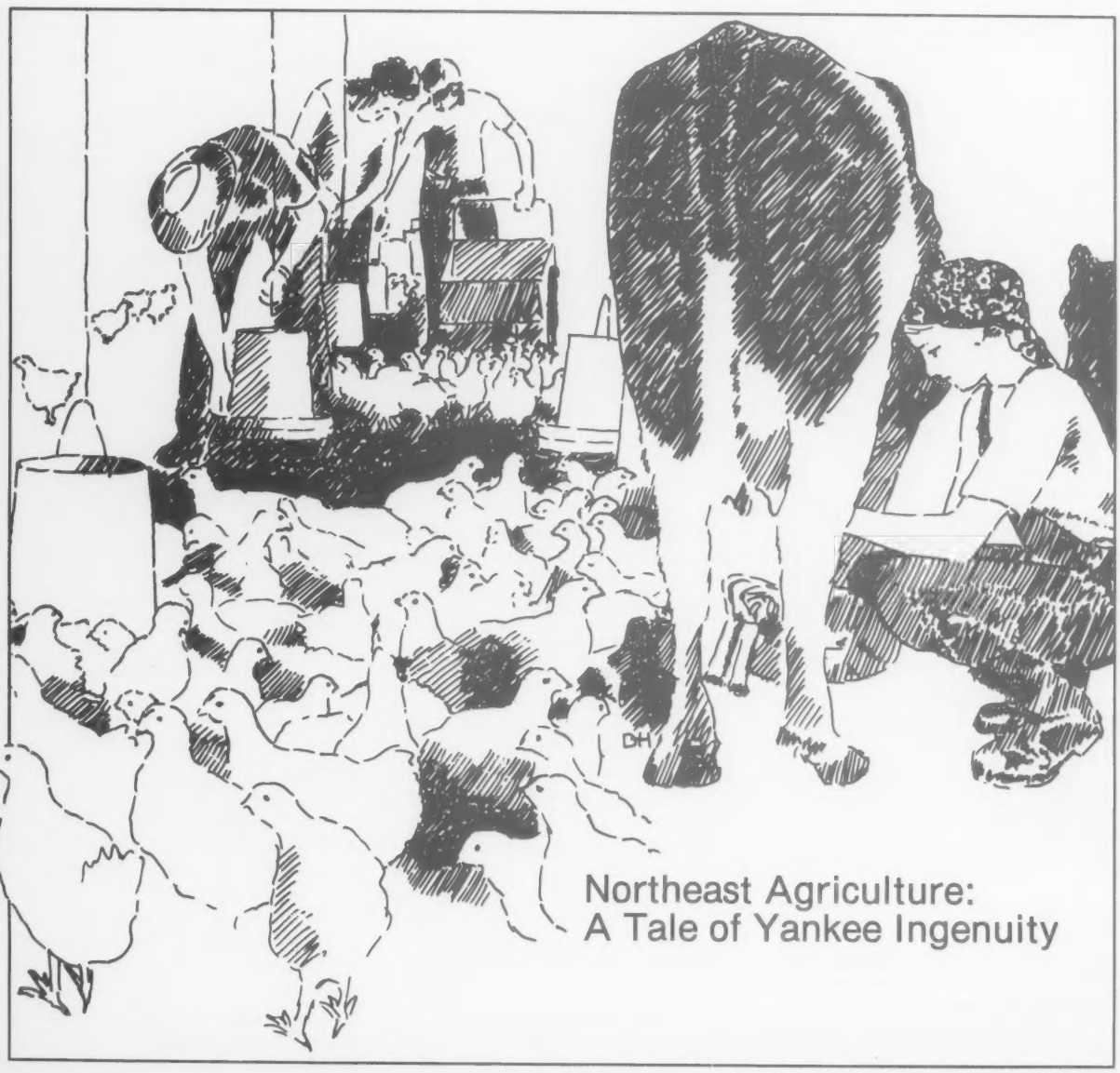

## Northeast Agriculture: A Tale of Yankee Ingenuity

# Outlook

With prices of just about everything going nowhere but up, it's good to know that food is an exception. Economists believe that the retail cost of food this fall will, on the average, be little higher than in the summer.

In fact, prices for crop-related foods might even come down if weather favors the harvest and coffee prices drift lower as expected. Potatoes, apples, and citrus fruits will be better buys in the next several months. But any price declines will be offset by moderate increases for vegetable oil products, processed fruits and vegetables, along with confectionery goods.

**The nitty-gritty for red meats.** Retail prices should hold steady. You might pay a bit more for beef, but pork could cost less than last summer. The increase in beef prices can be chalked up to higher handling costs.

**Birds for the holidays.** Broiler prices will nudge lower this fall. Chicken remains a big seller at the meat counter. Economists expect this year's consumption to topple all records.

The Thanksgiving turkey will cost a shade more than last year, although the supply situation will be about the same. In the consumption column, turkey isn't doing as well as chicken, with per capita use expected to be off from the record 9.2 pounds each American ate in 1976.

**Eggs on the rebound.** Egg prices will creep up this fall in keeping with the seasonal trend. Still, you can expect to pay less than a year ago at this time. Price of eggs hasn't reversed consumption trends. Per capita use continues to slide, and for all of 1977, it may be down around 2 percent from last year.

**Dairy follows suit.** Retail prices for dairy products will rise this fall as they usually do, although the increase near year's end might be more than usual. Milk prices on the farm are being buttressed by higher support prices this year. But the longer range picture is encouraging for consumers. The bumper feed grain crop in store this year will keep milk-feed price relationships very favorable. Also, output per cow should continue to show strong gains.

**Mixed fruit situation.** Prices for fresh items will decline this fall as the harvest comes in for the important apple and citrus crops. Situation is better for apples than pears, and on the processed side, retail prices will likely rise for fruits as well as processed vegetables due to higher costs of producing, processing, and marketing. Supplies will be ample, with the exception of frozen concentrated orange juice.

**At the bread counter.** Expect some price rise this fall for most cereal and bakery items. Large food grain supplies have resulted in much lower farm prices but the middlemen are paying higher costs at the marketing and distribution ends.

**Coffee break.** Wholesale coffee prices have dropped sharply since the summer. Brazil's output has made a comeback from the 1975 freeze, at a time when American drinkers have cut back in response to record prices at the supermarket. Hence, coffee prices should retreat this fall.

**Outlook time.** The 1977 National Agricultural Outlook Conference is set for Nov. 14-17 in Wash., D.C. Added attractions this year. For a preliminary program, write our Publications Unit, Rm 0054, ERS, USDA, Wash., D.C. 20250.

**OUTLOOK '78**

FOOD AND
AGRICULTURAL
OUTLOOK
CONFERENCE

NOVEMBER 14-17, 1977



Farm Index

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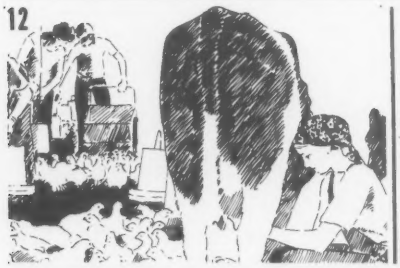

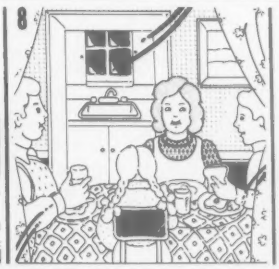

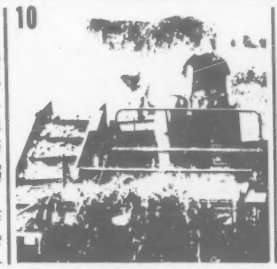

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# Awash in Wheat

American wheat farmers had a successful harvest this year, but their profits are floundering in a virtual sea of wheat.

After reaping the third consecutive bumper crop of better than 2 billion bushels—combined with 1.1 billion bushels of carryover stocks from 1976/77—the U.S. has amassed a record wheat supply of about 3.1 billion bushels.

The problem is that demand is lagging far behind supply, thus forcing prices to lower levels.

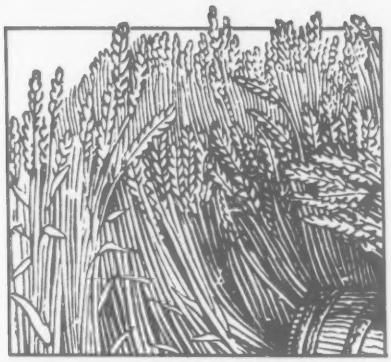
Total use of less than 1.9 billion bushels is forecast for this year, reflecting only small increases in both domestic and foreign consumption. This means that at the end of the 1977/78 season, carryover will be slightly higher than last year, which was the largest carryover since 1963.

**Surplus crunch.** For wheat farmers, the great surplus is disheartening news. Bulging stocks and limited storage space have already widened price spreads between the farm and major markets, and forced new crop prices down 10 to 15 percent below loan rates. While this has generated heavy loan activity, storage is in short supply, thus some growers have elected to sell rather than pay off-farm storage costs.

Once the harvest situation is settled, prices should strengthen seasonally, due to heavy loan placements and the 3-year reserve program.

Farmers will face a tough marketing decision this year as they weigh alternatives:

- If they sell their grain now for cash, they will likely receive the lowest return.
- By contracting for deferred pricing, farmers gamble that prices will increase during the season.



- If they have no storage facility, some farmers may sell for cash and buy futures, thus relying on rising prices to offset low cash prices.
- Store for later sale, perhaps through USDA's loan, purchase, and reserve programs. This alternative hinges on whether farmers believe that price increases will eventually cover storage and interest costs.

**Farm Bill provisions.** Farmers aren't the only people worrying about the wheat surplus. The new 4-year Farm Bill comes to grips with wheat production in several provisions, especially those concerning set-aside and deficiency payments. Although the bill had not been finalized at press time, these important provisions appeared likely:

- A wheat loan rate of $2.25 per bushel, unless wheat farm prices average $2.36 in 1977/78.
- Wheat target prices will be $3.05 if the 1978 crop is less than 1.8 billion bushels, or $3 if it is more.
- Target price payments will be based on the farmer's 1978 plantings, rather than on allotment history.
- Set-aside will be based on a percentage of a farmer's planted acreage, with no substitution of other crops for wheat allowed.
- Farmers will be required to comply with set-aside requirements for all program crops grown. If, for example, a farmer grows both wheat and feed grains, he must participate in all set-asides, or lose program benefits for crops which have no set-aside.

The 1978 plantings plus any set-aside will be limited by normal crop acreage (NCA). The NCA is basically the 1977 acreage planted.

- Maximum deficiency payments to a farmer can total up to $40,000, not including payments for disaster, resource adjustments, and public access for recreation.

**Outlook for prices.** In looking ahead, farmers must consider still another vital factor: Prices this season will probably continue to run near loan levels, barring a major crop failure elsewhere.

If wheat prices remain depressed, some farmers may wish to grow other crops instead. Feed grain target prices for 1978 in pending legislation are: corn, $2.10 per bushel; sorghum, $2.39; and barley, $2.33.

While pondering 1978 crop decisions, some farmers may be wondering just how they ended up with such a burdensome crop this year. After all, in early stages, all the forecasts seemed to indicate a much smaller 1977 harvest.

Despite a drop in acres planted, dry soil conditions during the fall planting, a bitter cold winter, and unfavorable weather in the early spring, abundant spring rains and optimum early summer weather developed into bumper production.

**High quality harvest.** Not only did farmers manage an ample harvest, but the quality was excellent, with high protein characteristics. The hard red winter wheat crop's protein level is the highest in a decade.

Although winter wheat plantings were down about 7 percent from 1976, an estimated 89.4 percent was harvested, compared with 88.3 percent in 1976.

Meanwhile, other wheat farmers around the world may be reaping their second consecutive big crop. Last year's world production was a recordbreaker, and the 1977 crop may be nearly that large.

Growing conditions have been generally good, except in the People's Republic of China (PRC), India, Mexico, and the Mediterranean countries.

With sharply higher carryover stocks, the world supply may reach a record level this season.

**Supply outstrips demand.** Despite a projected 6 percent increase in world consumption—mainly because of more wheat feeding—production should again outstrip use, thus piling up larger carryover stocks and fueling a highly competitive wheat export market.

Total world trade should reach a near record 67 million metric tons, with the U.S. accounting for about 40 percent of the total. If world wheat demand should increase unexpectedly, the U.S. would probably fill the bill, since other exporters are already heavily committed.

Despite the depressed farm prices, consumers may notice little if any difference in wheat-product prices at the grocery store. The retail price of a 1-pound loaf of bread eased slightly to 35.5 cents in May after a half-cent jump in April. The baking-wholesale price spread continued to widen, reaching 25 cents in May, or 70 percent of the price of the loaf. A year earlier, the spread accounted for ony 64 percent.

Meanwhile, the farm value of wheat used in the loaf dropped to 2.5 cents—the lowest since 1971.

[Based on special material provided by James J. Naive, Commodity Economics Division.]

# Farmers on the Move

Judging by the latest ERS estimates, the moving vans plying rural America had plenty of business in the first half of the seventies. Nearly 1.6 million people left farm homesteads between 1970 and 1976, leaving the U.S. farm population at 8.3 million—the smallest number since records have been kept.

The rate of decline, an ERS demographer points out, was much lower during 1970-76 than in the decade of the sixties. Farm population dropped 2.7 percent annually over the last 6 years, whereas the annual rate was 4.8 percent from 1960 to 1970.

Data for the last 2 years, however, show that the movement from farms may be on the increase: since 1974, the rate of decline in farm residents has accelerated to 5.8 percent a year.

**Country bound.** The moving vans aren't just leaving for cities, though. Just as many, or more, are going in the opposite direction. Analysts found that during 1970-75 the nonmetro areas, which include nonfarm dwellers, attracted people faster than the metro areas—a 6.6-percent growth rate, compared with 4.1 percent for the metro places.

Despite the large loss of farm residents since 1970 (15 percent overall), the Nation's agricultural might has not been impaired.

For reporting purposes, "farm population" means anyone who lived in rural territory on places of 10 or more acres, providing at least $50 worth of agricultural products were sold from the place in the reporting year. The definition also includes those living on places with less than 10 acres, if at least $250 worth of farm products were sold.

**New breed of "farm."** The official definition of a "farm" has since been changed to better reflect conditions in modern agriculture, and farm population estimates for 1977 will be made on that basis. Under the new definition of a farm, announced in August 1975, it's any place selling at least $1,000 worth, regardless of the number of acres held.

Meantime, demographers have charted regional patterns in farm population changes, although the forces behind them are not always clear.

Of the four major regions, the South suffered the heaviest loss. The Southern States in 1970-76 saw nearly a fourth of their farm residents leaving for other regions or else giving up their farm resident status as classified by the Bureau of Census. The Northeast came in second, losing 15 percent, followed by the North Central States, about 12 percent. The West, on the other hand, reported a gain in farm population of almost 5 percent.

**Most farm people live in North Central U.S.** In sheer numbers, the North Central region continues to house the most farm people—3.8 million in 1976, or 46 percent of the national total. The South ranks next, with 2.9 million (35 percent). The West holds third place (1 million and 12 percent), and the Northeast comes in last (597,000 and 7 percent).

The recent ERS report on farm population did not go into the reasons for the changes, although demographers have ventured some guesses.

In the case of the South, the forces are fairly obvious: the mounting trend toward mechanization of tobacco and the growing scale of cotton farms, both of which require fewer workers in the field. Also, blacks are fast leaving agriculture across the Nation, and the black farm population is concentrated in the South.

**Urban sprawl.** In the Northeast, pressures of urbanization continue to squeeze farms out of business. This is the most highly urbanized region, and the trend shows no signs of slackening.

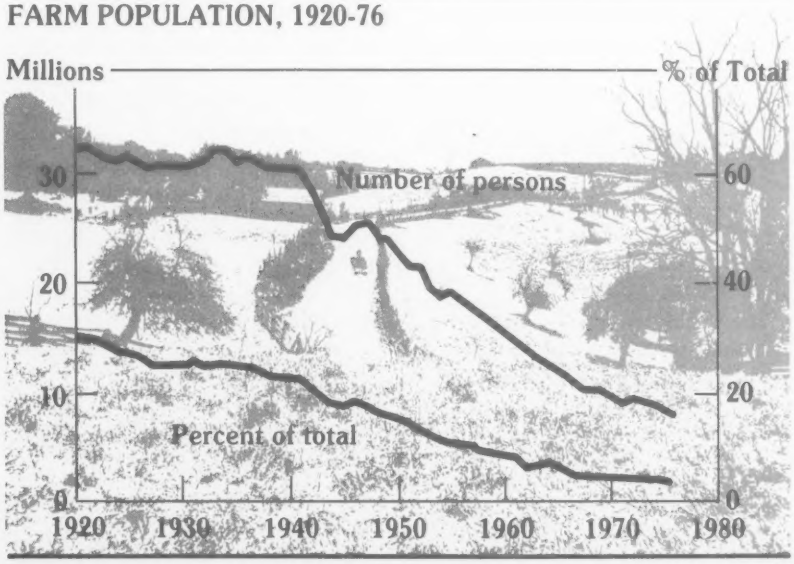
In the North Central States, the pressures come from a different source. This is the Nation's hub of commercial agriculture, where continuing consolidation of small farms seems to be the wave of the future. Most of the farms on the market are bought up by existing farmers. Newcomers have a hard time coming up with the cash to buy the high-priced land, not to mention the burden of financing the operation at today's spiraling cost of inputs.

**Back to the land.** The West—the only region reporting an increase in farm population—presents an interesting picture. The gains, slightly under 5 percent since 1970, was small, yet it seems to make the West the showcase of the "back-to-the-land" movement. Younger families may be buying marginal farmland to escape the pressures of urban living. Many are part-time farmers, as witnessed by the growth of roadside markets, but they still qualify as farmers under the old census definition. Another explanation is that irrigation projects have opened new areas to farming.

[Based on the manuscript, "Farm Population Estimates for 1976," by Vera J. Banks, Economic Development Division.]

**Historically, the downward trend in the number of farm residents has been accompanied by steady increases in the number of nonfarm residents — persons living in urban areas, small rural towns, and open country. Consequently, there has been a continuing decline in the farm share of the U.S. total. In 1976, about 1 person out of every 26, or 3.9 percent of the Nation's 214 million people, had a farm residence. When the number of U.S. farm residents reached its estimated peak in 1916, about 1 in 3 lived on a farm.**

FARM POPULATION, 1920-76



# Measuring Consumers' Food Intake

How many meals do Americans eat at home and away from home?

The question, long a bone of contention among researchers, is at least addressed by ERS, if not answered, by computing a retail value of all food and nonalcoholic beverages consumed and converting this value into a quantitative comparison that sidesteps a minefield of variables.

Many estimates have surfaced in attempts to gauge the number of meals eaten away from home. Estimates have ranged from a third or four-in-ten today, to a projected high on one-half or more by 1980.

It's no secret that more and more Americans are eating out and, apparently, eating out more often. The challenge is to accurately measure this changing relationship between at-home and away-from-home eating habits.

**Lack of data.** First, no available data series provide complete coverage of either expenditure or value of all food moving through the at-home and away-from-home markets. Thus, the first step in comparing the value and quantity of the two markets is to determine a total value that includes all areas where food is purchased or consumed.

This was done by using data from the Bureau of Labor Statistics' Consumer Expenditure Study, and information from the Department of Commerce and USDA on other sources of food consumption that were not part of the BLS study, such as patient feeding in hospitals and nursing homes, business food purchases, military food utilization, and other diverse sources.

The end product of this effort was a total expenditure figure reflecting the actual retail value of the food moving through each market. Retail values were estimated for food included in other paid services and the military and institutions.

**Interview drawbacks.** Past estimates of meals eaten out often have been based on information obtained from interviews with consumers and from information based on expenditures for meals consumed away from home.

Statistics gathered from surveys of consumers are plagued by a widely differing perception of what constitutes a "meal". While traditionalists think of a meal as being one of the "three squares" a day, others may eat from one to five meals or more, according to individual eating habits and interpretation of the term "meal." What may be a "snack" to some is a meal to others.

Other estimates of meals eaten away from home have been based simply on the percentage of total food sales or expenditures accounted for by the away-from-home market. One flaw to this method is:

The proportion of total expenditures made in the away-from-home market cannot be directly translated into the number of meals consumed away from home.

**Costs differ.** The price of a meal away from home is almost always greater than in-home preparation of a meal containing the same ingredients, since additional services of convenience are included in away-from-home meal price. Thus the cost-to-sales ratios are markedly different between establishments selling food for consumption at home and away from home.

Costs of away-from-home foods also may vary greatly for the same meal, according to the nature of the outlet. Costs similarly vary among food stores of various kinds, types, and sizes.

**Inflated estimates.** Without first adjusting for differences in price margins for food at home and food away from home, such estimates would be substantially inflated for the away-from-home market.

Additionally, the mix of foods consumed at home and away from home differs. For example, Americans eat more fruits and vegetables at home, and more dairy products, excluding fresh fluid milk, away from home. Cost per unit of the product used also varies.

Faced with such variables, considerable differences in estimates and interpretation have clouded attempts to analyze the away-from-home eating trends. The new ERS data don't substitute directly for number-of-meal estimates, but do provide a more realistic basis for judging the relative quantities moving through each market.

**Two indices used.** The ERS research measures two indices of food consumption: (1) the relative value of the markets for food and nonalcoholic beverages at home and away from home at retail and (2) the physical quantities moving into these markets.

The total market value at retail for all foods consumed by an average family was estimated at $1,831 for 1972-73. The away-from-home portion was $696, or about 38 percent.

To obtain an evaluation of physical quantities, ERS researchers adjusted retail values to wholesale values by using a food cost-to-sales ratio of .8 for food normally moving through food stores and .45 for eating places.

Researchers caution that the adjusted wholesale values provide only a basis for comparing the two markets and for computing relative percentages of physical quantities—they don't indicate the actual quantity of food consumed.

**Cost-to-sales ratio.** By applying the appropriate cost-to-sales ratio to the respective retail figures to remove differences in margins, the wholesale value of food consumed becomes $908 at home (74 percent), and $313 away from home (26 percent). Thus it becomes apparent that, based on quantity, a much smaller share of food moves through the away-from-home market than indicated by expenditures or retail value.

Although these estimates should not be directly equated with the number or proportion of meals and snacks eaten at home and away from home, they do provide a more realistic basis for such estimates than do unadjusted expenditure or value figures for each market. It should be noted that indexing the two markets to a wholesale value still does not address the different mix or grades of product which is consumed in each.

**Addressing issues.** This new approach which allows a physical comparison of quantities of food moving in each market would appear to provide a better base for examining such issues as food prices, eating habits, distribution channels, and commodity demand. In addition, nutritional inferences may be gleaned from the values.

Perhaps most significantly, the information provides a yardstick to measure the impact of the two major food markets and changes taking place in the quantity and value of food moving through each market.

[Based on special material provided by Michael G. Van Dress, National Economic Analysis Division.]

# Potatoes: Weapons Against Hunger

Food specialists are looking to the potato to help feed the world's billions.

In the U.S., Peru, and elsewhere, scientists are working to develop potatoes with more protein, more solids, and more vitamins.

Potatoes already are among the world's more nutritious vegetables, with substantial amounts of vitamin C and other nutrients. The typical potato has 76 calories per 100 grams (peeled)—less than an apple—2 grams protein, 17 grams carbohydrates, and is 86 percent water. That large water content, researchers feel, can be reduced, by replacing the moisture with more solids.

Many potato processors pay on the basis of the amount of solids; that is, the dry matter as well as the potatoes' actual weight are figured into the price. Making the average potato drier, then, would boost its quality.

**Less shrinkage.** A drier potato would be desirable for another reason: Most potatoes—85 percent—are fall-harvested, then stored over the winter. During those months, under constant temperatures of about 45°F., potatoes lose up to 20 percent of their weight through evaporation. Thus, the crop that started at 100,000 cwt. in the fall might be down to 80,000 cwt. by March. The higher the solids content, the less weight loss.

One new variety that seeks to solve many of these problems is the Atlantic, developed by USDA researchers. The Atlantic is 18-20 percent solids, compared with most varieties at 15 percent. Atlantic is also more disease-resistant in most areas than other potatoes, and is generally hardier.

**The recovered Atlantic.** For example, Maine—one of the largest potato States—sloshed around in 28 inches of rain in 1976, an unusually wet year there, and most potatoes suf-

fered badly. The heavy rains arrested growth in some, and many potatoes never fully recovered. But the Atlantic did, and that small crop came in strong.

This year, barely 300 acres of Atlantic were planted for certified seed around the country. It'll be at least 5 years before enough certified seed is produced to satisfy the expected demand.

That demand is apt to come from all over the East, Midwest, and West. Atlantic doesn't appear to be doing well in only two areas: New Jersey and Long Island in New York State. In those regions, Atlantic tends to contract diseases it doesn't pick up elsewhere. Growers are making positive reports from Colorado, Nebraska, Florida, Mississippi, Alabama, and other States.

**Gauging the effects.** It's too early to tell yet whether Atlantic will have a major impact on the potato industry, but researchers are encouraged. They recommend Atlantic especially for processing—chipping, in soups, frozen, dried, or canned—but not for simple boiling. The spuds don't seem to take well to hot water or salads.

Experimenters in Peru aren't so concerned with boiling as they are with finding high-protein potatoes that will thrive in the tropics. And they're making progress.

In the past 5 years, they've taken the multicolored South American spuds—red, yellow, purple, white, green, and black—and bred them scientifically to form a new breed that can grow in the warmer climates. At the same time, these researchers at the International Potato Center in Lima are seeking to raise the protein level of potatoes, and make them more disease-resistant. Some scientists working on the project say the potato may become one of the world's leading all-around food sources by the 21st century.

**No surprises.** If that happens, it'll come as no surprise to the estimated 33,000 American farmers who grow potatoes. Records were shattered last year, as they dug 357 million cwt., for a farm value of $1.3 billion. The record farm value came in 1974 and 1975—$1.4 billion. And the market is growing.

Americans today are eating more potatoes than they did in the 1950's. Per capita consumption is roughly 120 pounds a year. The lowest per capita consumption came in the mid-1950's, when it dipped to 106 pounds.

We're eating many more processed potatoes than we used to, especially frozen French fries. In 1975, for example, about 112 million cwt. were consumed as table stock, while over 76 million cwt. were consumed as frozen French fries, and another 16 million went for other frozen potato specialties. This compares with 1970 consumption of 130 million cwt. table stock, and 62 million cwt. frozen.

**Chips still popular.** Chip and shoestring consumption, though, hasn't changed much in recent years, hovering around the 33-34 million cwt. mark.

Likewise, seed and feed uses have been fairly constant, at 20 million cwt. and 4 million cwt., respectively.

Since 1970, processed uses have outpaced fresh. Out of the 118 pounds per capita consumption in 1976, 52 pounds were fresh potatoes and 67 processed. This compares with 1960, when fresh was 84 pounds, and processed was 25 pounds.

As these eating habits were changing, other big changes were taking place in the fields—examples of the "Green Revolution."

Mechanization reached out and grasped the industry, moving it from primarily hand labor in the 1950's, to primarily automation today. About the only hand work left on the typical commercial potato farm is associated with grading and packing.

**Discouraging costs.** Equipment costs on today's farms discourage many newcomers, including those aimed toward the potato industry. Farmers are concerned about the lack of young people starting in potato farming. Blame lies in two general directions:

(1) Many farmers say potatoes are an "iffy" proposition. Some growers consider themselves fortunate if they have one good price year out of three.

(2) Initial equipment costs are very high, and young people often have trouble getting adequate financing.

Like many other farmers, potato growers' numbers are dwindling. But also like other farmers, each one is able to take on more acres than when hand labor predominated, and potato-growing continues to flourish.

And if the scientists in Peru are right, the world may learn to depend on the stable staple in the next century even more than it does now.

[Based on special material from Charles Porter, Commodity Economics Division; and Raymon E. Webb, Agricultural Research Service.]

# Northeast Agriculture: A Tale of Yankee Ingenuity

**This is the fourth in a series of articles on regional agriculture.**

From the dairy operations in Pennsylvania to the potato farms in Maine, agriculture in the Northeast U.S. is still a common sight, although it's a far cry from the heyday of 200 years ago when a handful of Northeastern States almost single-handedly fed the entire Revolutionary Army.

Less than a million of the Nation's 9 million farm residents live in the 12-State area (Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont, and West Virginia), yet they produce a wide assortment of commodities, some of which have made the region famous.

Nationally known Northeast specialties include strawberries, cranberries, blueberries, buckwheat, maple sirup, ducklings, Christmas trees, mushrooms, grapes, and brown eggs—the world's largest brown egg operation is in Maine.

**Livestock's importance.** But livestock production—namely dairy and poultry—is the heart of the area's agricultural economy. In 1975, cash receipts for livestock products averaged 62 percent of the region's total receipts—ranging from 32 percent in New Jersey to a whopping 92 percent in Vermont.

Of the total livestock receipts, over half were for dairy products. In that year, dairy products were the number one cash commodity in 7 of the 12 States—Connecticut, Massachusetts, New Hampshire, New York, Pennsylvania, Vermont, and West Virginia—and in all of the remaining States they ranked among the top five money-making products. (Broilers were the leading commodity for cash receipts in Delaware and Maryland; greenhouse and nursery in New Jersey and Rhode Island; and potatoes in Maine).

**Small farms.** Unlike some parts of the country where livestock production is the major industry, Northeast farms are small, averaging only 169 acres in 1974. In contrast, the national average that year was 417 acres, and in the Mountain States—a big livestock area—the average farm size was over 2,000 acres.

Another distinctive characteristic of Northeast agriculture is that the farm family tradition is firmly rooted in the area, with many families farming the same pieces of land that their ancestors had farmed more than two centuries ago.

Excellent transportation facilities, adequate rainfall (only about 4 percent of the area's farms are irrigated—3 percent of the Nation's total), and the proximity to major markets helped Northeast farmers net $1.1 billion in farm income in 1975, about 5 percent of the $22.7 billion that all farmers earned that year (unrevised figures, the latest available at press time).

**Value of agricultural production.** And with 7 percent of the Nation's farms and about 3 percent of the land in farms, the region produced $5.7 billion worth of farm goods in 1975—about 6 percent of the total national farm output of nearly $90 billion (unrevised figures).

Although not as impressive as the production figures from some of the other agricultural regions, 6 percent is not bad when you consider that nearly two-thirds of the Northeast's 128 million acres are covered with forest, while less than a fifth is in grassland pasture and cropland. Nationwide, the numbers are about one-third and one-half.

**Dwindling cropland.** To make matters even more difficult for Northeast farmers, the amount of land available for crop production has been dwindling in recent years, while forest land has been spreading. From 1949 to 1974, the region's cropland acreage dropped by nearly one-third —more than for any other area— while the amount of land in forest jumped by over a tenth. The national average during this period showed cropland falling about 6 percent and forest acreage holding its own.

Among the States of the Northeast, the New England States, with the exception of Connecticut, lost over half their cropland during the 25-year period. The other States lost less on a percentage basis, except Delaware, which actually increased its cropland by 13 percent.

**Valuable farmland.** One explanation for the region's cropland loss is that farmland values in the Northeast are extremely high, thus perhaps tempting farmers to sell their land. (Another incentive for selling their land is the fact that Northeast farmers can't compete economically with some of the other agricultural regions, such as the Corn Belt.)

During the 1970's, for example, farmland values in the Northeast grew at a faster rate than in the Nation as a whole—nearly tripling between 1967 and 1976. Urban expansion pressures (one out of every four Americans live in the area), the "back-to-the-land" movement, and demand for recreational and industrial sites all contributed to the boost of farmland values. Intense pressures to develop the region's limited land base have caused the Northeast to become perhaps the most innovative section of the country in the area of land use planning. Numerous legislative attempts to control land use have been initiated by State and local governments.

**No top honors.** The limited land base is certainly one factor keeping the Northeast from being the leading producer of any of the most important U.S. commodities. None of the 12 States ranked among the top 20 farm States in 1975 (based on the value of cash receipts), although Pennsylvania and New York came in 22nd and 23rd.

Because of their small size, Maryland and New Jersey were far back on the list, yet both States have thriving agricultural economies.

Northeast States that ranked among the leading 10 States for cash receipts for the 25 top commodities in 1975 were:

- Connecticut—seventh in the Nation for tobacco.
- Delaware—broilers, eighth.
- Maine—potatoes, fourth; broilers and eggs, tenth.
- Maryland—broilers, sixth; and tobacco, eighth.
- New Jersey—tomatoes, fourth; and greenhouse and nursery, seventh.
- New York—apples and grapes, second; dairy, third; greenhouse and nursery, fourth; and potatoes, seventh.
- Pennsylvania — apples and grapes, fourth; dairy and eggs, fifth; greenhouse and nursery, eighth; and tomatoes, tenth.
- West Virginia—apples, eighth.

**Two leaders.** In addition to the big money-making crops, Pennsylvania

## Delmarva's Success Story

In the Delmarva Peninsula there's no question about whether the chicken or the egg came first. The chicken did —Mrs. Wilmer Steele's chicken to be exact.

Today's multimillion dollar broiler industry has put the tristate area (Delaware, Maryland, and Virginia) on the map, and it all started back in 1923 with Mrs. Steele of Ocean View, Del.

In that year, Mrs. Steele—the manager of a small flock of laying hens—was raising a brood of 500 chicks as replacements. Instead of using all of the replacement flock on her farm, as had been customary, she sold most of it to a local poultryman for the handsome price of 62 cents a pound. This sale netted her about $1,200—a substantial sum for that time.

It didn't take long for word of this new, and apparently profitable, farming enterprise to spread to nearby Maryland and Virginia, where the Delmarva poultry industry was ultimately to take shape. But it was several decades before modern production methods approached the high level of efficiency now achieved by the U.S. broiler industry.

Over the years, nutritionists, geneticists, poultry pathologists, and other professionals, as well as thousands of broiler growers and hatching egg producers, have all worked toward advancing the industry to its present high level.

Perhaps the best single indicator of the success of the U.S. poultry industry, of which the Delmarva group forms a major part, is the fact that in the 1970's the consumption of chickens rose to a high of 38 pounds per capita annually—up from 8.5 pounds in the 1950's.

Many consumers can remember when chicken was so expensive that it was served only for Sunday dinners or special occasions. In those days, while some chicken at the wholesale level was put in cold storage, the rest was handled by live poultry dealers who sold small quantities to butcher shops—where the birds were slaughtered and dressed. It wasn't until the 1950's that eviscerated, chilled broilers from the producing centers became readily available at consumer outlets.

Today, the mass production and marketing of dressed poultry has been achieved, making chicken readily available in supermarkets at reasonable prices.

The Delmarva industry has been a leader in catering to the needs and preferences of the consumer, helping provide such services as tray packaging, which enables shoppers to select individual parts or cut-up whole chickens.

Delmarva chicken has earned an excellent reputation for consistent high quality and flavor, which can be evidenced by the number of fine restaurants throughout the world that serve "Chicken a la Maryland."

[Based on "Breadbasket of the Revolution: Maryland Agriculture, 1776-1976," published by the Maryland Agriculture Week Committee.]

was first in the Nation for mushrooms, while Vermont led for maple products.

The region is at a disadvantage in that the production of three of its more important commodities—milk, chickens, and eggs—requires the heavy use of concentrate feed, most of which must be supplied from other parts of the country. The substantial freight bill added to the feed is enough to dishearten any livestock producer.

And to make matters worse, some feel that there is discrimination against the Northeast in the setting of railroad freight rates for feed. For instance, the freight rate for corn shipped to New England from Toledo, Ohio—a major shipping point—is more than double the rate to Atlanta from St. Louis—another big outlet.

Although mileage for the former rates is greater than for the latter, even on a ton-mile basis the rate to New England is higher. And to add insult to injury, corn traditionally sells at a higher price in Toledo than in St. Louis.

**Principal commodities.** Nevertheless, milk, chickens, and eggs continue to be the backbone of the region's agricultural economy. In 1975, the Northeast produced about a fifth of the Nation's total for each of these commodities. Other important farm products are potatoes, noncitrus fruit, hay, vegetables, oats, corn, barley, tobacco, dry beans, cattle and calves, hogs, wheat, and soybeans.

Fresh vegetable production—especially in New York and New Jersey —has fallen off some in recent years. The reasons: labor costs that are

higher than in most other parts of the country and better yields in California and the Pacific Northwest.

**Direct marketing.** Direct marketing innovations, such as "growing-and-picking-your-own" vegetables, while important in certain local areas of the Northeast, have yet to make a sizable dent in statewide production statistics.

Such activities take place almost entirely in the summer and can't be counted on to provide a large share of the Nation's requirements as long as most consumers expect a year-round supply of fresh vegetables. States like California, Arizona, Florida, and Texas—that produce fresh market vegetables for 9 months of the year or longer—are at a definite advantage.

Nevertheless, from now until 1985, the Northeast is expected to increase vegetable production faster than the Nation as a whole to meet projected demand. The same holds true for milk, cattle and calves, potatoes, dry beans, noncitrus fruit, tobacco, and oats.

**Other projections.** The region's production of broilers and barley is projected to increase at the same pace as the rest of the country, while increases in the production of hogs, eggs, corn, and soybeans will be slower than for the Nation.

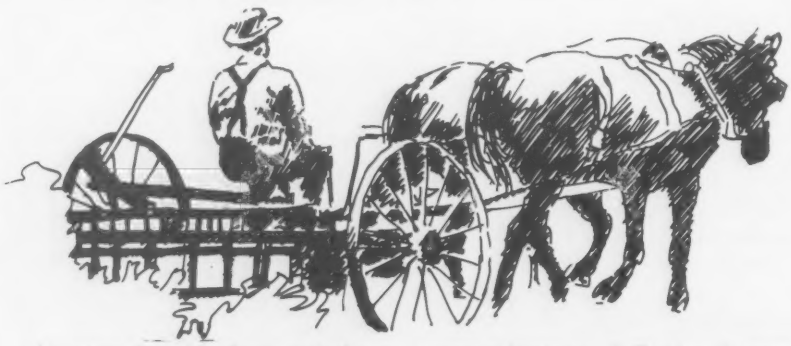
Thus, despite their problems with high feed costs, dwindling cropland, and expanding urbanization, Northeast farmers appear capable of keeping some of the region's agricultural production competitive with other parts of the country—an accomplishment that can probably be credited to Yankee ingenuity and determination, as much as to anything else.

## LEADING CASH CROPS FOR 1975

| | | | |
|---|---|---|---|
| CONN. | Dairy Products<br>Eggs<br>Greenhouse & Nursery | N.J. | Greenhouse & Nursery<br>Dairy Products<br>Eggs |
| DEL. | Broilers<br>Corn<br>Soybeans | N.Y. | Dairy Products<br>Eggs<br>Greenhouse & Nursery |
| MAINE | Potatoes<br>Eggs<br>Broilers | PA. | Dairy Products<br>Cattle & Calves<br>Eggs |
| MD. | Broilers<br>Dairy Products<br>Corn | R.I. | Greenhouse & Nursery<br>Dairy Products<br>Potatoes |
| MASS. | Dairy Products<br>Greenhouse & Nursery<br>Eggs | VT. | Dairy Products<br>Cattle & Calves<br>Eggs |
| N.H. | Dairy Products<br>Eggs<br>Apples | W.VA. | Dairy Products<br>Cattle & Calves<br>Apples |

[Based on special material from Thomas Frey, Washington, D.C., and Nelson Bills, Cornell University, Natural Resource Economics Division; Donald Durost and Wayne D. Rassmussen, National Economic Analysis Division; Charles Porter, Washington, D.C., and George Frick, University of New Hampshire, Commodity Economics Division; Jerry Webb, University of Delaware, Judith Cooper, University of Maine, Robert Rathbone, University of Maryland, Russell Smith, Rutgers University, Thomas McCormick, University of Vermont, and Joseph Fasching, West Virginia University, all with the Cooperative Extension Service; Frederic Winthrop, Jr., Massachusetts Department of Food and Agriculture; Stan Bernstein, Public Information Office, University of Rhode Island; and the manuscript, "The Rural Northeast: A Perspective for Research Priorities," prepared by a committee of USDA and the universities of the Northeast.]

# Farming the Amish Way



No story about Northeast agriculture would be complete without mention of the industrious Pennsylvania Dutch, who settled the Keystone State nearly 300 years ago.

These early German descendants brought with them excellent farming skills, and the counties where they took residence—Lancaster, Berks, Lebanon, Lehigh, and others—still remain prosperous farming country.

Perhaps the most distinctive of the group are the "plain people"—members of the Amish, Mennonite, Dunkard, and other small religious sects—who make up less than a tenth of the Pennsylvania Dutch.

Scattered through much of the State—with a heavy concentration in Lancaster County—are the Amish who still adhere to Old World customs, dress, speech, and methods of transportation, farming, and entertainment. Their farms have prospered for nearly three centuries, and Lancaster has earned the reputation of being the 'Garden Spot of the Nation."

Amish children are reared in their parents' footsteps. Following 8 years of education—which is considered enough to lead a normal life in Amish society—teenaged girls are taught homemaking, while the boys are instructed in farming.

Although the woman's responsibility is the operation of the home, she and the older girls also work in the fields during harvest time, and young girls are expected to tend the animals and do chores in the garden and field, same as the boys.

By the time the young Amishman is 17 or 18, he has extensive knowledge of animal husbandry, crop rotation, and farm finances. And the young woman is a skilled homemaker, capable of managing household finances and rearing a large family.

Amish parents provide their sons with a farm and their daughters with "Haush-dier" — furnishings for the house—when they marry.

Most of the food used by the family is grown, canned, butchered, and baked on the farm. Pantries and cellers bulge with jars of fruits and vegetables, crocks of pudding, luscious bolognas, dried beefs hanging from hand-hewn rafters, and piles of potatoes, turnips, yams, onions, and other stored foods.

The surplus is used for church affairs, entertainment (which is always combined with work—quilting bees, barn raisings, and threshing parties), and as reserve for unexpected emergencies, such as fires, deaths, and floods.

While the non-Amish uses a variety of powered farm equipment, the Amish prefer animal and human labor. Only the simplest of machinery is permitted. Noisy one-cylinder gas engines are used for milk cooling, corn shelling, washing machines, and ice cream and butter churns.

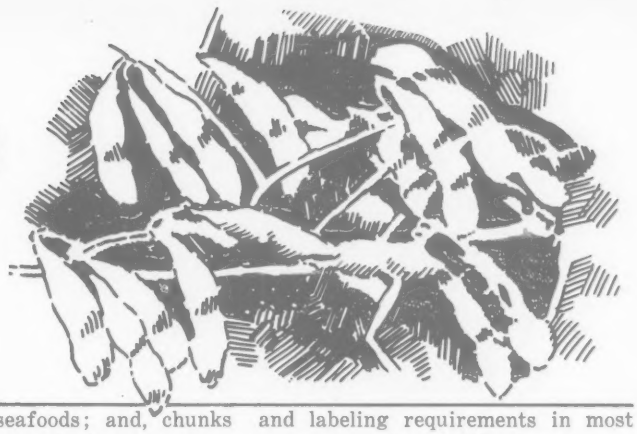
Another acceptable source of power is the massive old steam engine, which the Amish use in threshing and filling the silo, and in steaming their tobacco beds to kill insects and purify the ground.

All other conveyances rely solely on horse power. Work horses, usually heavy Belgium or Clydesdales, are used for the heaviest farmwork. Draft mules are also used, and because they give a longer day's work for less feed and water, they're highly desirable and harder to acquire than the work horses.

Because of the heavy use of horses for farmwork and for pulling buggies and wagons, the village blacksmith, who has virtually disappeared from modern America, can still be found throughout Lancaster County. Amish horses need to be shod every 3 or 4 months, depending on how much they are driven on the macadam roads.

[Based on "The Gentle People: A Protrait of the Amish," by James A. Warner and Donald M. Denlinger, published in 1969 by Mill Bridge Museum and Grossman Publishers, Inc.]

# Soy: A Vegetable Posing as Everything



Each item of that eight course dinner on the table before you—breads, drinks, main dishes, desserts—could have the same prime ingredient: soy protein.

That's not as far-fetched as it might seem at first blush. The soy protein industry increased its output by 72 percent in the years 1967-73, helping to manufacture items as diverse as pet foods and imitation coffee.

Soybean oil, meanwhile, was also becoming more popular. In 1960, about 36 percent of the 8.3 billion pounds of food fats and oils consumed was soybean oil. By 1975, soybean oil accounted for 60 percent of the 12 billion pounds of fats and oils consumed. And use is still growing.

Last marketing year, soy protein production was estimated to top a billion pounds (flour basis), and it may increase another 71 percent between 1976 and 1985—a surge equivalent to just over 6 percent a year.

**Versatile beans.** Researchers have found that soybeans, like peanuts, when processed right make not only an excellent livestock and poultry feed (soybeans for feed take about 97 percent of total farm production each year), but can also be transformed into a myriad of human foods, such as:

- Soy flour for baked goods, as an aid to bleaching, as a dough conditioner, and as a browning aid.
- Flour and grits combined with whey for a drink that's part of the foreign food aid program.
- Textured soy flour as a meat extender in ground beef, chicken, turkey, and seafoods; and, chunks of it as a meat substitute in stews and salads.
- Powdered concentrates and isolates for imitation dairy products, including whipped toppings, milk replacers, and baby foods.

The burgeoning pet food industry is using soy protein products more and more. Pet food manufacturers have become the largest single user of industrial-grade soy protein.

Still, it's estimated that more soy protein was used for human food than for industrial products—62 to 38 percent (625 million to 385 million pounds) in 1976. And by 1985, the proportion is expected to change little—61 to 39.

**Food from isolates.** Growth in human food use will likely be highlighted by stepped-up use of soy isolates. That should increase at an annual rate of about 8 percent.

Soy concentrate use may soar 80 percent, but the market share will change only from 15 to 16 percent.

While human food uses will still outstrip industrial uses by 1985, and both will expand, the industrial side will swell faster. Human food made from soy products other than oil might increase by 68 percent, but industrial uses will probably shoot up 75 percent.

**Alterations.** Of course, these estimates of growth in the soy protein industry are far from exact; they can be altered by a number of factors. The events most likely to influence expansion are these:

*Market developments.* Currently, U.S. Government and foreign agencies limit the amount of soy protein that can be added to certain foods, and labeling requirements in most cases are strict. Modification of some of the limitations could open new doors for the soy protein industry.

*Consumer acceptance.* People change eating habits slowly. So acceptance of new foods takes time, perhaps years. Trends toward more away-from-home eating and use of more convenience foods could give soy proteins a boost.

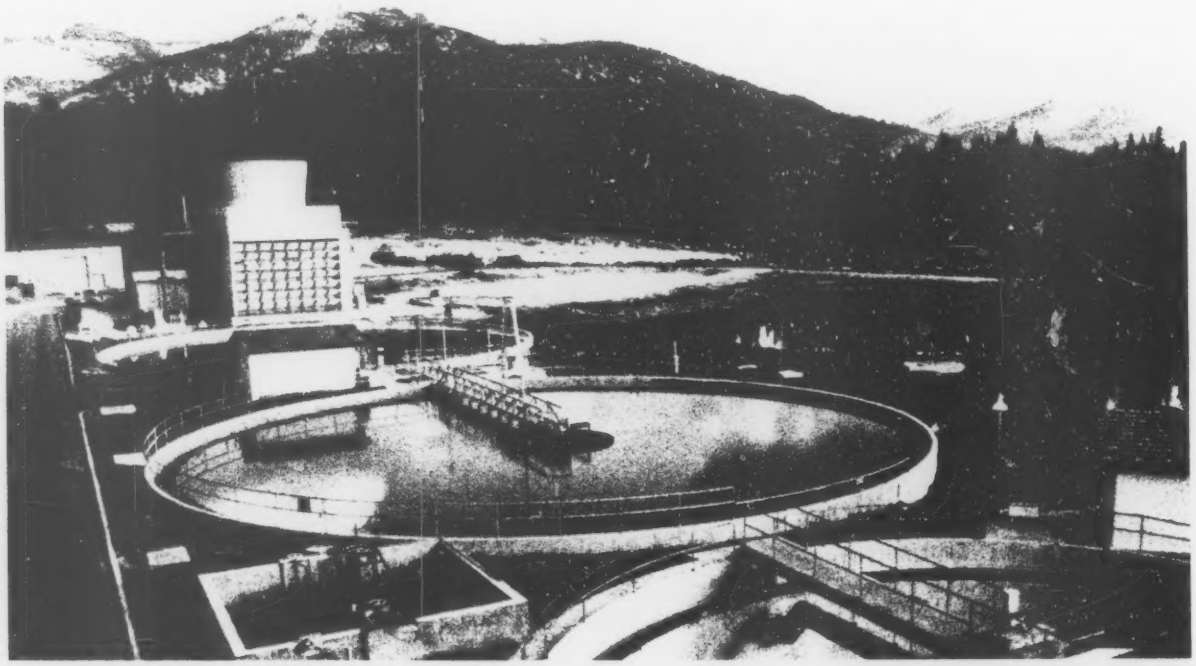
*Product development.* No matter what the other attractive qualities of soy protein are, you're not apt to eat more of it if you don't like its taste or appearance. The soy protein industry is continuing efforts to improve the flavor and appeal of soy, besides finding new uses for it.

*Price relationships.* If animal proteins continue their long-term increase in price, the use of soy protein will probably become more desirable to food manufacturers. Because meat prices have more and different kinds of pressures on them, the gap that already exists between the cost of animal proteins and soy proteins is expected to widen. Of course, soy will never replace meat entirely, but it will probably be increasingly combined with meat in certain products.

*Net returns.* So far, the profits from soy protein production have not been impressive. But they're expected to improve, and if they do, investors will encourage more growth in this expanding industry.

[Based on the article, *Soy Protein Industry: Estimated Production and Growth Potential,* by Bert Miner, Farmer Cooperative Service, and William W. Gallimore, National Economic Analysis Division.]

# Gallons vs. Dollars: The Wastewater Cleanup



Treating wastewater in America is becoming an expensive proposition —especially for small towns, which face a compliance deadline in a few months.

These communities, many of them with small treatment plants, often have to spend 2½-3 times as much to clean sewage as larger communities spend to clean an equal amount. The reason is the size of the treatment plants.

A small rural community—5,000 people or fewer—may spend 61 cents per 1,000 gallons for cleaning waste water, using a method involving activated sludge treatment following sedimentation (allowing the solids to settle out of the water).

A larger community, using the same methods, typically spends about 23 cents per 1,000 gallons. The small town may operate a 0.5-million-gallon-per day (mgd) plant, while the larger community may use a 5-mgd facility.

**Waste by gallon.** The amount of waste to be treated is prodigious, especially in industrial towns. Counting only domestic water use, people generate an average 100 gallons of waste water per person daily, so a community of 10,000 people has a million gallons a day to handle. Add in industrial wastes, and that total can easily multiply several times.

Treatment of the waste is not only necessary to protect the environment, it's required by Federal law. P.L. 92-500, the Federal Water Pollution Control Act, requires all communities to provide "the best practical" sewage treatment this year, and "the best available" by 1983.

The difference is largely in degree of cleanliness. "Best practical" treatment, according to the U.S. Environmental Protection Agency (EPA), is equivalent to secondary treatment—the water isn't as clean

as it can be, but most pollutants have been removed, consistent with reasonable cost.

"Best available" treatment, EPA says, will make the water as pure as necessary to insure surface water quality.

**Paying for treatment.** Besides making these definitions and deadlines, EPA is authorized under the water pollution act to reimburse a community for up to 75 percent of the costs of sewage treatment facility construction, and USDA's Farmers Home Administration can cost-share 50 percent of construction costs in rural communities with less than 10,000 population that do not receive EPA assistance.

. But even with Federal assistance, or with cost-shares offered by many States, local jurisdictions can be forced to bear relatively heavy financial burdens. Building and operating a sewage treatment plant, even a small one, can be a municipal budget buster.

**No bargain.** A community of 3,700 people in upstate New York, for instance, with a new $9 million treatment facility ordered and subsidized by the Federal government, faced a municipal operating budget increase of 30 percent. Plus, each residence was billed $200, the sewer connection fee, when the plant was finished.

The Federal and State subsidies often are an important aid to communities. A 50-percent subsidy on construction costs can cut treatment costs on a 0.5-mgd facility from 61 cents per 1,000 gallons to 47 cents. A 75-percent subsidy will bring costs to the community down to 39 cents.

But even this savings leaves the small towns paying more per 1,000 gallons than the larger communities, with their larger treatment plants. The 50-percent subsidy at the larger plant brings the 23-cent unsubsidized cost down to less than 18 cents. A 75-percent subsidy brings those costs to about 14 cents.

**Less from the start.** Making the problem worse, the small towns get less of the Federal money in the first place.

Communities with populations under 5,000, 12 percent of the urban population, have received 9 percent of the Federal dollars in construction grants awarded under the program. But communities with populations in excess of 25,000—67 percent of the urban populace—were granted 72 percent of the money.

Additional help for small communities to meet Federal sewage treatment requirements could be given in a number of ways, falling into two broad categories: (1) modifying treatment requirements, and (2) setting up new funding arrangements for small communities.

Modifying treatment requirements for rural areas might allow the discharge of water still containing some pollutants. In many areas, with small populations and little industry, area streams can handle the purification naturally, with no environmental damage.

Regions that already have severe water quality problems would not be able to use this treatment shortcut. Currently, all areas are required to clean water to the same level. But tailoring requirements to fit the area might help cut costs in some places. Such tailoring hasn't yet been allowed by EPA.

**Making change.** Establishing new funding arrangements designed for small communities might be more difficult than tailoring water quality requirements. Currently, Federal law allows the same percentage subsidy for construction of small plants and large plants, even though the cost impact of such construction—and later operating expenses—is greater on the small town.

A possibility would be to remove the 75-percent ceiling on Federal aid, and for the Federal Government to pay 100 percent of initial construction costs for smaller plants. Care would have to be taken by the Federal Government to avoid encouraging construction of a multitude of small plants by communities that really need larger combined facilities.

Even with 100-percent subsidy of construction costs, 0.5-mgd plants will have higher operating and maintenance costs per thousand gallons than unsubsidized 5-mgd plants: 31 cents compared with 23 cents. If the 10-mgd plant receives a 75-percent construction subsidy, under present regulations local costs come to 14 cents/1,000 gallons.

To bring the local costs for the smaller facility to that level, an additional 50-percent subsidy of operating and maintenance costs would be needed.

[Based on the article "Impact of Wastewater Treatment Regulations on Rural Communities," in *Journal of Northeastern Agricultural Economics Council*, Vol. VI, No. 2, Oct. 1977, by C. Edwin Young, Natural Resource Economics Division at University Park, Pa.]

Commodity Profile

# The Ebb and Flow of Dairying

To some 400,000 farms in the U.S., dairy cattle are an important source of food and income. The interest in milk extends to 1,600 dairy product manufacturing plants employing over 200,000 people, and to nearly all consumers.

At-home expenditures for dairy products amount to about 16 percent of the annual food bill in America. Farmers' cash receipts in 1976 were a record $11.4 billion, a 15-percent boost from 1975's previous high of $9.9 billion.

Milk production last year was over 120 billion pounds, up 5 billion over 1975, and it's rising further this year. But it's still less than what it used to be. The reductions perhaps are indicative of the twists and turns the dairy industry has been taking the last couple of decades.

**Bovines fading away.** The number of cows has been slowly shrinking, but output per cow has gone up. For example, last year, the Nation's 11 million dairy cows produced nearly 11,000 pounds of milk apiece. In 1974, there were 100,000 more cows, but each averaged 593 fewer pounds of milk. Back in 1960, American farms boasted 17.5 million milk cows, but the per-cow output was a mere 7,000 pounds.

Besides yields going up because of better and more scientific feeding, husbandry, and dairying methods, herds have been getting larger, and they're on fewer farms than they used to be. Back in the late 1950's, nearly 2 million farms had dairy cattle, and most of the herds had less than 20 cows.

**The swelling herds.** Today, only about 400,000 farms have dairy cattle, with most commercial herds numbering more than 30 cows. Moreover, according to a recent USDA study, by 1980 only 200,000 dairy farms will be producing the domestic milk supply. And they'll be doing it from even larger herds, the study says.

Another dairy industry change is in the way people use the product. Americans are generally drinking less milk than they used to, but they're eating more products made from milk.

Fluid milk, although still the mainstay of the dairy industry, slipped from 48 percent of the market supply of dairy products in 1966, to 44 percent last year. Butter, too, is taking a smaller share—17 percent last year, compared with 20 percent in 1966.

**Munching lots of cheese.** By contrast, cheese's share has surged, from only 14 percent in 1966 to almost 24 last year. A decade ago, Americans ate about 17 billion pounds of domestic cheese a year, but by last year, we sliced into 29 billion pounds of it.

Even so, total dairy product consumption has declined substantially —Americans ate or drank 548 pounds (milk equivalent basis) apiece last year, compared with 653 in 1960. The fact nevertheless remains that nearly everyone consumes some milk,

albeit less than they used to.

Reflecting the recent upswing in milk production, stimulated by the higher milk support rate and the trend to reduced consumption, the surplus of dairy products this spring reached the highest level in 5 years.

A broad market base coupled with the trend toward fewer dairy farms brings up a distribution problem: How to transport such a perishable product ever greater distances, while keeping costs under control.

**Milk on the road.** Trucks are used to haul most milk from the farm to the processor, and from the processor to the city consumers. By 1985, an ERS study warns, truck transportation costs of milk could go up by 38-53 percent, depending on the distance the milk is hauled. Increased fuel prices, labor costs, and other variables will boost the costs.

A few steps can be taken to check the escalating costs, however. Better maintenance on trucks will, for example, trim fuel intake and possibly prolong the life of the trucks. Boosting the road weight limit now in effect on milk trucks (differing among States) to 80,000 pounds from its present 73,280 pounds could help keep costs per hundredweight (cwt.) down. Such a move would allow the number of gallons per load to rise from its current 5,750 to 6,200.

However, even taking the increased load limit into account, the ERS study still forecasts that transportation costs per cwt. per 100 miles could rise.

These added costs are coming at a time when dairy farmers' incomes are not keeping pace with increased costs, or with the economy in general.

**Small returns.** For example, in June, farmers received $9.37 per cwt., on the average, for milk. That's only 23 cents above year-earlier prices. If production rises as it's expected to this fall, 1977 retail prices will average only 3-4 percent higher than 1976. Even with cheese sales forging ahead—and yogurt sales increasing spectacularly (last year we ate more than twice as much yogurt as we did in 1971)—dairy sales overall have been sluggish, and may remain so.

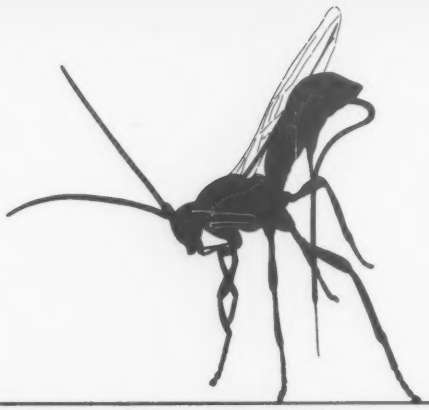
If production gains continue this fall and sales remain slow, the Commodity Credit Corporation (CCC) will probably continue to purchase more surplus milk than last year. CCC purchases in 1977 could be the largest in 6 years. Government purchases in the 1976/77 marketing year were equivalent to 3.4 billion pounds of milk (fats-solids basis).

[Based on *The Dairy Situation*, by James J. Miller and Charles N. Shaw, Commodity Economics Division; and on the manuscript, "Truck Transportation Costs of Bulk Milk," by Harold W. Lough, Commodity Economics Division.]

## COMMODITY PROFILE: DAIRY

| | |
|---|---|
| Production | Over 120 billion pounds in 1976, down 3 percent from 1965 but 4 percent above 1975 |
| Leading States | Wisconsin, California, New York |
| Consumption | 548 pounds per capita in 1976, about 2 pounds more than 1975 |
| Foreign trade | The U.S. imports less than 2 percent of its dairy consumption, and exports only about 1 percent of production. |
| Trends | While Americans are drinking less milk per capita, they're eating more in the forms of cheese and yogurt. Such consumption gains as in the past year could continue in the short run, especially if per capita incomes rise. |

# Insect Predators: Nature's Way of Fighting Pests



Valuable allies in farmers' battles against bugs may well be other bugs.

More than 240 insect species now show resistance to insecticides, and the cost of chemical insecticides is increasing and their use is being more strictly regulated to assure good environmental quality and to protect human health.

Because of this, there is renewed emphasis on the use of natural enemies such as predatory mites, green lacewings, and parasitic wasps to manage insect pests. In previous years, insect predators for use against pests were imported and used on a "one-shot" basis. Now, current research has made it feasible to extend this idea.

Augmentation—the practice of periodically bolstering beneficial insect populations already living in an area—while in its infancy in the U.S., is a supplement to a "once and for all" importation and release of natural enemies. It involves seeding an insect-infested area with as many as 50,000 insectary-reared natural enemies per acre over a 10 to 12-week period. Under controlled conditions, these insect predators and parasites can reduce harmful insect pest populations to manageable levels, allowing reduced use or elimination of chemical insecticides.

**Importing predators.** Importation (as distinguished from augmentation) of natural enemies has been used to reduce insect populations in this country for some time. As early as 1888, citrus growers imported the vedalia beetle from Australia to combat cottony cushion scale.

For the past 20 years, parasites of the alfalfa weevil have been imported successfully in New Jersey and 12 other States—at an estimated savings of up to $7 million in crop losses. In New Jersey alone, the percentage of cropland treated with insecticides dropped from 94 percent in 1966 to 8 percent in 1975.

The economic effects of using augmentation in the U.S. are difficult to assess because of limited use. However, there are some examples. For several years, southern California citrus growers formed cooperatives to control California red scale with small parasitic wasps. Wasps and mealybug predators are released by the cooperative at a cost between $10 to $12 per acre.

One private California insectary reports that using insect predators in cotton fields of the Imperial Valley and in the citrus groves of Ventura County assures yields and significantly reduces insect control costs.

**Insecticide problem.** One of the most serious drawbacks to the use of augmentation in the U.S. is coordinating the use of natural enemies and the use of chemical insecticides. For example, chemical spray drifting from one field can kill beneficial predators as well as pests in nearby fields.

While some farmers prefer using natural enemies to control insect pests, insecticides are still by far the dominant weapon. One of the main reasons is price—insecticides represent only about 2 percent of farmers' total production costs. And, until the last few years, many farmers regarded insecticides as an inexpensive form of insurance. This attitude often encouraged spraying of many crops, whether insect pests reached dangerous thresholds or not. For example, some farmers sprayed cotton —one of the field crops most vulnerable to insects—10 to 15 times a season.

**Foreign application.** More widespread use of augmentation is found outside of the U.S. The U.S.S.R., for example, and the People's Republic of China are the largest practitioners of augmentation in field crops. In 1975, small parasitic wasps that attack the eggs of cutworms, corn borers, and other moth and butterfly pests were released on 18.5 million acres in the Soviet Union and on at least 1.7 million acres of cotton in China.

In the future, the problems surrounding the use of chemical insecticides—resistance, cost, and regulation—are expected to continue. To fight an effective war against insects, chemical insecticides and nonchemical controls, such as augmentation, will have to be coordinated.

**Other options.** Other options that researchers expect to be put into the arsenal include: development of insect resistant strains of plants; genetic modification of insects; cultural techniques which create favorable environments for natural enemies; artificial food and sex attractants; microbial agents, such as virus or bacteria; and growth regulators.

Meanwhile, farmers must continue to rely on chemical treatments.

[Based on material from a forthcoming book entitled, "Biological Control by Augmentation of Natural Enemies," by N. H. Starler, Natural Resource Economics Division, and R. L. Ridgway, ARS.]

# Economic Trends

[1] Ratio of index of prices received by farmers to index of prices paid, interest, taxes, and farm wage rates. [2] Average annual quantities of farm food products purchased by urban wage earner and clerical worker households (including those of single workers living alone) in 1959-61—estimated monthly. [3] Annual and quarterly data are on 50-State basis. [4] Annual rates seasonally adjusted second quarter. [5] Seasonally adjusted. [6] As of March 1, 1967. [7] As of Feb. 1.

Source: U.S. Dept. of Agriculture (Agricultural Prices, Foreign Agricultural Trade, and Farm Real Estate Market Developments); U.S. Dept. of Commerce (Current Industrial Reports, Business News Reports, Monthly Retail Trade Report and Survey of Current Business); and U.S. Dept. of Labor (The Labor Force and Wholesale and Consumer Price Index).

| Item | Unit or Base Period | 1967 | 1976 Year | 1976 July | 1977 May | 1977 June | 1977 July |
|---|---|---|---|---|---|---|---|
| **Prices:** | | | | | | | |
| Prices received by farmers | 1967=100 | — | 186 | 194 | 194 | 184 | 180 |
| Crops | 1967=100 | — | 197 | 214 | 214 | 198 | 182 |
| Livestock and products | 1967=100 | — | 177 | 179 | 176 | 173 | 179 |
| Prices paid, interest, taxes and wage rates | 1967=100 | — | 192 | 194 | 204 | 204 | 203 |
| Prices paid (living and production) | 1967=100 | — | 188 | 190 | 200 | 198 | 198 |
| Production items | 1967=100 | — | 193 | 196 | 205 | 203 | 201 |
| Ratio [1] | 1967=100 | — | 97 | 100 | 95 | 90 | 89 |
| Wholesale prices, all commodities | 1967=100 | — | 183.0 | 184.4 | 195.2 | 194.4 | 194.8 |
| Industrial commodities | 1967=100 | — | 182.4 | 182.7 | 194.2 | 194.6 | 195.8 |
| Farm products | 1967=100 | — | 191.0 | 196.9 | 204.3 | 192.7 | 190.5 |
| Processed foods and feeds | 1967=100 | — | 178.0 | 182.6 | 192.8 | 190.1 | 187.8 |
| Consumer price index, all items | 1967=100 | — | 170.5 | 171.1 | 180.6 | 181.8 | 182.6 |
| Food | 1967=100 | — | 180.8 | 182.1 | 191.7 | 193.6 | 194.6 |
| **Farm Food Market Basket:** [2] | | | | | | | |
| Retail cost | 1967=100 | — | 175.4 | 176.8 | 178.0 | 179.3 | 180.4 |
| Farm value | 1967=100 | — | 178.8 | 182.7 | 179.8 | 178.0 | 180.7 |
| Farm-retail spread | 1967=100 | — | 173.2 | 173.1 | 176.9 | 180.1 | 180.2 |
| Farmers' share of retail cost | Percent | — | 40 | 40 | 39 | 39 | 39 |
| **Farm Income:** [3] | | | | | | | |
| Volume of farm marketings | 1967=100 | — | 121 | 112 | 99 | 113 | 113 |
| Cash receipts from farm marketings | Million dollars | 42,817 | 94,326 | 7,669 | 6,696 | 7,099 | 7,100 |
| Crops | Million dollars | 18,434 | 47,937 | 3,963 | 2,750 | 3,983 | 3,400 |
| Livestock and products | Million dollars | 24,383 | 46,389 | 3,706 | 3,946 | 3,116 | 3,700 |
| Realized gross income [4] | Billion dollars | 49.9 | 103.6 | — | — | 108.8 | — |
| Farm production expenses [4] | Billion dollars | 38.2 | 81.7 | — | — | 87.1 | — |
| Realized net income [4] | Billion dollars | 11.7 | 21.9 | — | — | 21.7 | — |
| **Agricultural Trade:** | | | | | | | |
| Agricultural exports | Million dollars | 6,380 | 22,996 | 1,799 | 2,199 | 1,882 | 1,749 |
| Agricultural imports | Million dollars | 4,452 | 10,992 | 958 | 1,257 | 1,240 | 1,015 |
| **Land Values:** | | | | | | | |
| Average value per acre | Dollars | 168[6] | 390[7] | — | 456[7] | — | — |
| Total value of farm real estate | Billion dollars | 182[6] | 396[7] | — | 460[7] | — | — |
| **Gross National Product:** [4] | Billion dollars | 796.3 | 1,706.5 | — | — | 1,869.7 | — |
| Consumption | Billion dollars | 490.4 | 1,094.0 | — | — | 1,194.0 | — |
| Investment | Billion dollars | 120.8 | 243.3 | — | — | 294.9 | — |
| Government expenditures | Billion dollars | 180.2 | 361.4 | — | — | 390.6 | — |
| Net exports | Billion dollars | 4.9 | 7.8 | — | — | −9.8 | — |
| **Income and Spending:** [5] | | | | | | | |
| Personal income, annual rate | Billion dollars | 62.6 | 1,382.7 | 1,386.2 | 1,517.3 | 1,524.3 | 1,536.0 |
| Total retail sales, monthly rate | Million dollars | 26,151 | 54,324 | 53,754 | 59,181 | 58,438 | 58,741 |
| Retail sales of food group, monthly rate | Million dollars | 5,759 | 11,749 | 11,614 | 12,660 | 12,551 | 12,483 |
| **Employment and Wages:** [5] | | | | | | | |
| Total civilian employment | Millions | 74.4 | 87.5 | 87.8 | 90.4 | 90.7 | 90.6 |
| Agricultural | Millions | 3.8 | 3.3 | 3.3 | 3.4 | 3.3 | 3.2 |
| Rate of unemployment | Percent | 3.8 | 7.7 | 7.8 | 6.9 | 7.1 | 6.9 |
| Workweek in manufacturing | Hours | 40.6 | 40.0 | 40.1 | 40.4 | 40.5 | 40.3 |
| Hourly earnings in manufacturing, unadjusted | Dollars | 2.83 | 5.19 | 5.20 | 5.95 | 6.00 | 6.00 |
| **Industrial Production:** [5] | 1967=100 | — | 129.8 | 130.7 | 137.4 | 138.3 | 139.0 |
| **Manufacturers' Shipments and Inventories:** [5] | | | | | | | |
| Total shipments, monthly rate | Million dollars | 46,487 | 98,168 | 98,932 | 109,458 | 110,884 | — |
| Total inventories, book value end of month | Million dollars | 84,527 | 166,587 | 162,144 | 172,629 | 173,818 | — |
| Total new orders, monthly rate | Million dollars | 47,062 | 98,497 | 98,811 | 111,693 | 111,702 | — |

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